SECTION 3-FACE ASSEMBLY

3.1 Face Assembly Description and Features

The face assembly includes the face skin, foam assembly, face plate, and 5 compression load cells with impact plates. The load cells are distributed across the entire face plate, one at each eye, cheek, and one at the center of the chin. The load cells are provided to measure the total load applied to the face. Human soft tissue over the face is represented by foam sandwiched between two rubber sheets. The impact stiffness of the foam/rubber was selected to match human impact loading characteristics. **Figure 3.1** shows a drawing of the THOR face assembly.

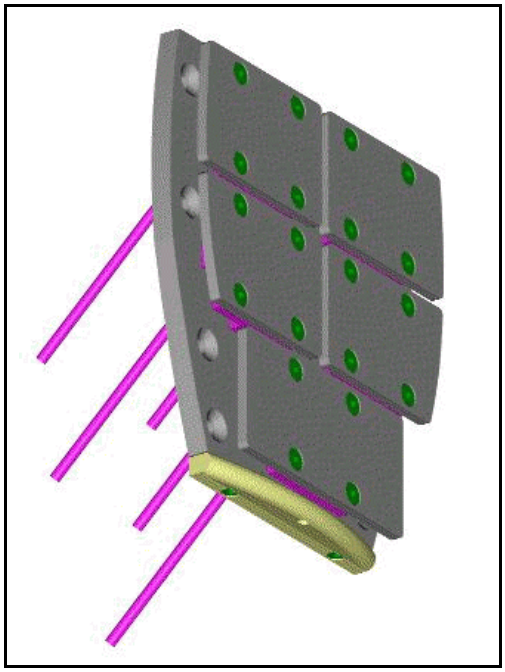

Figure 3.1- Face assembly

3.2 Assembling the Face

The parts list as well as all quantities for the face assembly are listed in Appendix I - Bill of Materials under the face section. Refer to drawing T1FCM000 in the THOR drawing set for a detailed mechanical assembly drawing. **Figure 3.2** is a drawing of the exploded head assembly and hardware.

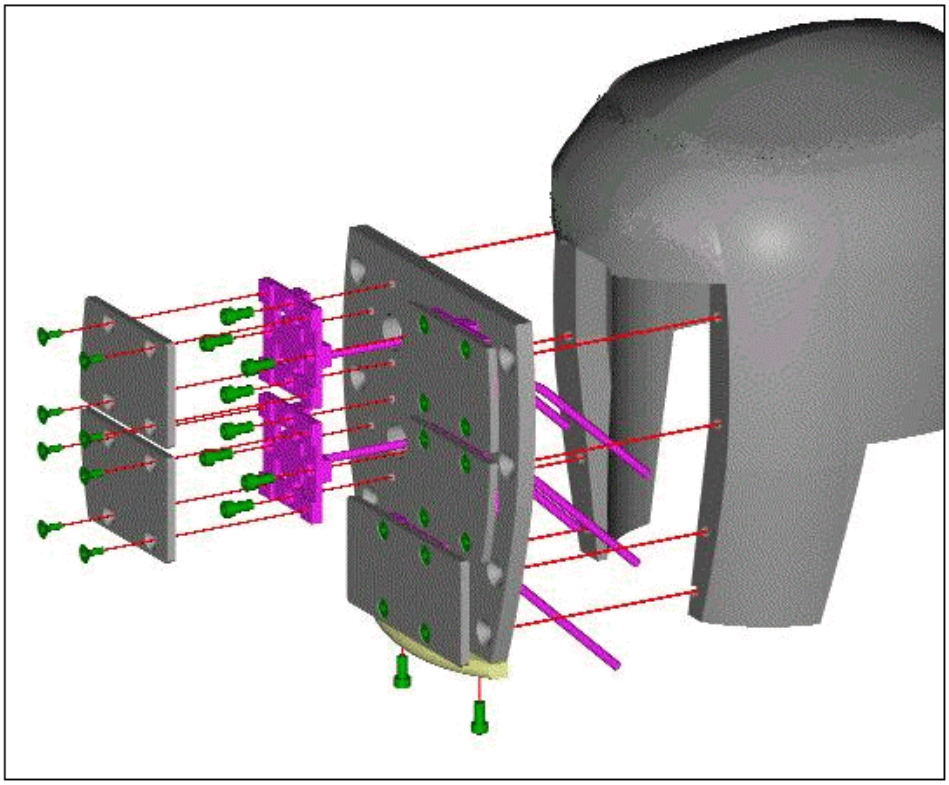

Figure 3.2- Exploded face assembly

3.2.2. Assembly of Face Components

The following procedure is a step-by-step description of the assembly procedure for the face components. The numbers provided in () refer to a specific drawing / part number of each particular part. The numbers noted in {} after the bolt size indicate the size of the hex wrench required to perform that step of the assembly. All bolts should be tightened to the torque specifications provided in Section 2.1.3.

1. Install the face load cells (T1INM430) onto the face plate (T1FCM110) using four #6-32 x 3/8" SHCS {7/64} per load cell. The load cells are oriented onto the face plate so that the instrument wires can easily slide through the holes in the face plate. **Figure 3.3** can be used as a reference for proper rotation of the Load Cells.

2. At this point, it is necessary to attach the Face plate (T1FCM110) to the head (T1HDM111) using eight #10-32 x 1/2" FHCS (1/8"). Route the load cells wires inside the head and out the back. **Figure 3.4** demonstrates this step.

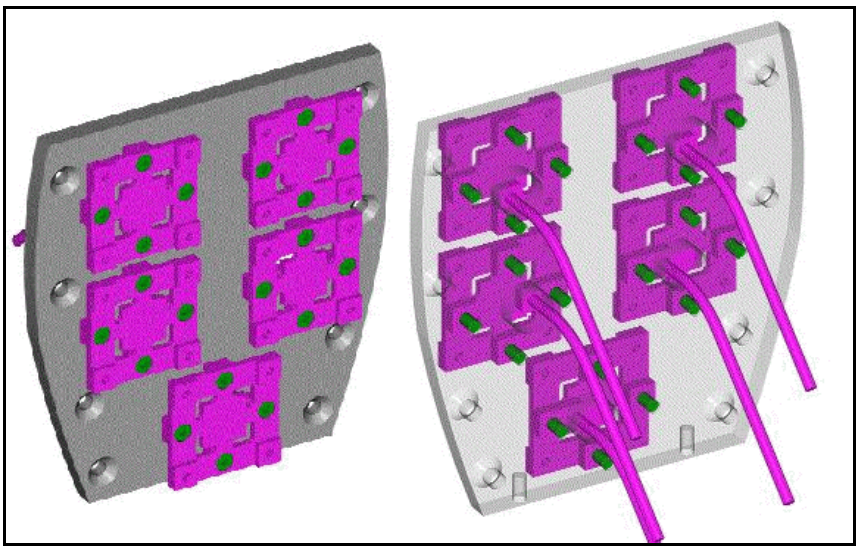

Figure 3.3- Attachment of Load Cells to face plate.

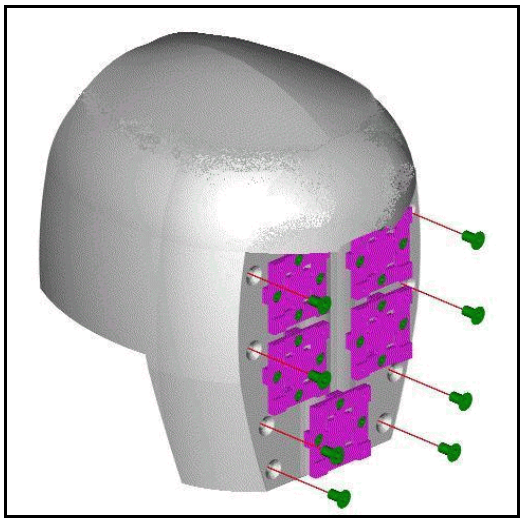

Figure 3.4- Attachment of face plate to head.

3. Install the respective load cell plates (T1FCM112, T1FCM113, T1FCM114, T1FCM115, & T1FCM116) onto the face load cells using four #6-32 x 3/8" FHSCS {5/64} per plate. Each load cell plate is shaped differently to match the contour of the front of the head casting. The load cell plates are labeled, "l-eye, r-eye, l-cheek, r-cheek, and chin according to the location on the face, that the load cell plates should be attached. **Figure 3.5** is an illustration of the attachment of the load cell plates to the face load cells.

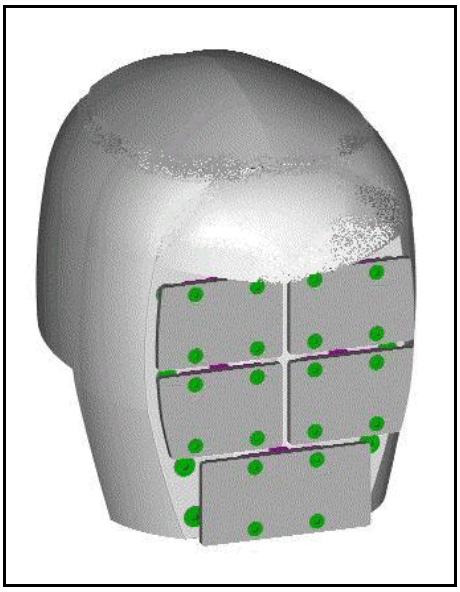

Figure 3.5- Load cell plates attached to load cells.

4. Locate the plastic chin guard and attach it to the face plate with the angled side downwards and out using two #10-32 x 3/8" SHCS (1/8"). Refer to **Figure 3.2** for an illustration.

5. With the head skin fully assembled onto the skull, install the face foam assembly (T1FCM060) and face skin (T1FCM050) onto face. Velcro is located on the side of the head skin and the inside edge of the face skin to hold the skin with foam to the head. Using four #10-24 x 1" FHSCS {1/8}, secure the side of the face skin to the head. Using one #6-32 x ½ FHSCS {5/64}, secure the bottom of the face skin to the chin guard. Refer to **Figure 3.6** for a drawing of the face skin installation.

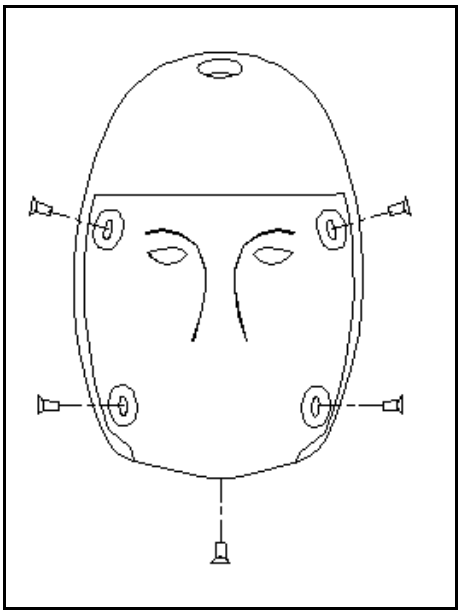

Figure 3.6- Face skin installation

3.3 Adjusting the Face Assembly

No adjustments are required for the face assembly.

3.4 Electrical Connections and Requirements

The face load cell wires are grouped with the wire from the head tilt sensor and a wire from the fore and aft neck spring compression load cells. The bundle of wires are routed out the back of the head. Refer to Section 4, Head Assembly for further details.

3.5 Face Certification

The face assembly is certified by the manufacturer using two different dynamic impact tests. The impacts are done on the face with two different loading surfaces and impact speeds while the force is recorded by the load cells on the face and the load cell on the impact test machine. Certification procedures for these tests are described in the THOR Certification Manual which is available from the manufacturer as a separate publication.

3.6 Inspection and Repairs

After a test series has been performed, there are several inspections which may be made to ensure that the dummy integrity has remained intact. Good engineering judgement should be used to determine the frequency of these inspections, however the manufacturer recommends a thorough inspection after every twenty tests. The frequency of the inspections should increase if the tests are particularly severe or unusual data signals are being recorded. These inspections

include both electrical and mechanical inspections. This inspection is most easily carried out during a disassembly of the dummy. The disassembly of the face components can be performed by simply reversing the procedure used during the assembly.

Although this disassembly is very simple, some comments are provided below to assist in the process.

3.6.1 Electrical Inspections (Instrumentation Check)

This inspection should begin with the visual and tactile inspection of all instrument wires from the face instrumentation. The wires should be inspected for nicks, cuts, pinch points, and damaged electrical connections which would prevent the signals from being transferred properly to the data acquisition system. The instrument wires should be checked to ensure that they are properly strain relieved. A more detailed check on the individual instruments will be covered in Section 15 - Instrumentation and Wiring.

3.6.2 Mechanical Inspections

Several components in the face assembly will need a visual inspection to determine if they are still functioning properly. This mechanical inspection should also involve a quick check for any loose bolts in the main assembly. Each area of mechanical inspection will be covered in detail below. Please contact the manufacturer regarding questions about parts which fail the mechanical inspection.

Face Foam Assembly Inspection: The following checklist should be used when inspecting the dummy's face foam assembly for post-test damage.

- Check the foam for tears and rips.
- Check the foam for permanent compression.
- Check the rubber sheet on both sides of the foam assembly for tears and other damage.

Face Skin: The following checklist should be used when inspecting the head skin for post-test damage.

- Check the face skin for tears and other damage.